Claims

1. A sharpening unit to sharpen a disk-shaped cutting blade (19) with a bevel (205) with a continuous circular cutting edge (203), comprising a first grinding wheel (81) and a second grinding wheel (83) acting on a first side (207) and on a second side (209) of said bevel (205), characterized in that: said first grinding wheel (81) has a finer grain than said second grinding wheel (83); the inclination of said first grinding wheel is such that when the unit is in operation, said first grinding wheel is placed against the first side (207) of the blade with a slightly greater inclination than the inclination of the first side, in respect of a lying plane (PG) of the cutting edge of the blade, while the inclination of said second grinding wheel (83) is substantially parallel to the second side (209) of said bevel, and said second grinding wheel is arranged and designed to sharpen the cutting bevel of the blade, while said first grinding wheel is arranged and designed to apply a reaction force to said blade to prevent or reduce flexure of the blade in the sharpening area and eliminating any burrs produced by the second grinding wheel from the cutting edge.

2. Sharpening unit as claimed in claim 1, characterized in that said first and said second grinding wheel are provided with a movement to move towards and away from the blade according to a direction essentially parallel to their axes of rotation.

3. Sharpening unit as claimed in claim 2, characterized in that the movement to move said first and said second grinding wheel towards the blade is controlled so that the first grinding wheel comes into contact with the first side of the blade before the second grinding wheel comes into contact with the second side of the blade, and moves out of contact with said first side of the blade after the second grinding wheel has moved out of contact with the second side of the blade.

4. Sharpening unit as claimed in claim 3, characterized in that the movement to move the grinding wheels towards and away from the blade is controlled so that the first grinding wheel moves out of contact with the first side of the blade after said blade has made at least one turn around its axis subsequent to the second grinding wheel moving away from the second side.

5. Sharpening unit as claimed in one or more of the claims from 1 to 4, characterized in that said first and said second grinding wheel are motorized.

6. Sharpening unit as claimed in one or more of the claims from 1 to 5, characterized in that the inclinations of said first and said second grinding wheel are

equal and opposite in respect of a lying plane of the cutting edge of the blade, said lying plain being essentially orthogonal to the axis of rotation of the blade.

7. Sharpening unit as claimed in one or more of the claims from 1 to 6, characterized in that said first grinding wheel has an extremely fine grain, from 7 to 46 according to ISO standards, and preferably around 7.

8. Sharpening unit as claimed in one or more of the claims from 1 to 7, characterized in that said second grinding wheel has a fine grain, between 45 and 91 according to ISO standards and preferably between 70 and 80.

9. A cutting machine to cut rolls of wound web material, comprising:

- at least a disk-shaped blade (19) rotating around an axis of rotation (B-B) and having a cutting bevel (205), with a continuous cutting edge (203), defined by a first side (207) and by a second side (209), the first side having a greater radial extension than the second side, and at least said first side having a surface hardening treatment;
- at least a sharpening unit (80) for said blade, with at least a first grinding wheel (81) acting on said first side (207) and a second grinding wheel (83) acting on the second side (209);

characterized in that: said sharpening unit is produced according to one or more of the claims from 1 to 8.

10. Cutting machine as claimed in claim 9, characterized in that the inclination of the first grinding wheel (81) in respect of the first side (207) of the bevel and the thickness (T) of said hardening treatment allow the cutting edge (203) of the blade to remain within the thickness that has been subjected to hardening treatment.

11. Cutting machine as claimed in claim 9 or 10, characterized in that said first and said second grinding wheel are equipped with a movement to move them towards and away from the blade according to a direction essentially parallel to their respective axis of rotation, said movement also recovering wear on the blade caused by successive sharpenings.

12. Cutting machine as claimed in one or more of the claims from 9 to 11, characterized in that the inclinations of said first and said second grinding wheel are equal and opposed in respect of a lying plane (PG) of the cutting edge (203) of the blade (19), said plane being essentially orthogonal to the axis of rotation (B-B) of the blade, and in that the inclinations of said two sides (207, 209) of the bevel (205) of the blade are different in respect of the lying plane (PG) of the cutting edge of the

blade, the first side (207) having, in respect of said lying plane, a lesser inclination than the second side (209).

13. Cutting machine as claimed in one or more of claims 9 to 12, characterized in that said first side (207) is substantially parallel to the lying plane (PG) of the cutting edge of the blade.

14. Cutting machine as claimed in claim 12, characterized in that the difference in inclination between said first and said second side is at least 1° and preferably between around 1.5° and around 2.5°.

15. Cutting machine as claimed in one or more of the claims from 10 to 14, characterized in that the thickness of said hardening treatment of said first side is equal to or greater than 30 micrometers and preferably equal to or greater than 80 micrometers and even more preferably equal to or greater than 90 micrometers, and even more preferably equal to or greater than 100 micrometers.

16. Cutting machine as claimed in one or more of the claims from 9 to 15, characterized in that at least said first side of the blade has a surface hardness greater than 70 HRC and preferably equal to or greater than around 72 HRC.

17. Cutting machine as claimed in one or more of the claims from 9 to 15, characterized in that said blade is made of alloy steel.

18. Cutting machine as claimed in one or more of claims 9 to 17, characterized in that at least said first side has a surface treatment obtained by penetration of molecules or atoms within the structure of the base material forming the blade.

19. Cutting machine as claimed in claim 18, wherein said surface treatment is a controlled nitriding treatment.

20. Cutting machine as claimed in one or more of claims 9 to 17, characterized in that at least said first side has a surface treatment consisting in a deposit of a material which is harder than the base material forming the blade.

21. Cutting machine as claimed in at least claim 17, characterized in that said blade is made of chrome steel containing molybdenum.

22. Cutting machine as claimed in one or more of the claims from 9 to 21, characterized in that the inclination of said first side is equal to or less than 9° and preferably equal to around 8° in respect of said lying plane (PG).

23. Cutting machine as claimed in one or more of the claims from 9 to 22, characterized in that said blade (19) has a body delimited by two planes (201A, 201B) essentially parallel to each other and essentially orthogonal to the axis of rota-

tion (B-B) of the blade.

24. Method for sharpening a disk-shaped blade (19), to cut rolls of web material, rotating around an axis of rotation (B-B), said blade having a cutting bevel (205), with a continuous cutting edge (203), defined by a first side (207) and by a second side (209), the first side having a greater extension in a radial direction than the second side, and at least said first side having a surface hardening treatment; wherein a first grinding wheel (82) acts on said first side and a second grinding wheel (83) acts on said second side,

characterized in that:

- said first grinding wheel (81) has a finer grain than said second grinding wheel (83);
- said first grinding wheel (81) is placed against the first side (207) of the blade with a slightly greater inclination than the inclination of the first side, in respect of a lying plane (PG) of the cutting edge of the blade;
- said second grinding wheel (83) is placed against the second side of the blade with an inclination essentially corresponding to the inclination of said second side in respect of said lying plane;
- wherein said second grinding wheel sharpens the cutting bevel, while said first grinding wheel applies a reaction force to said blade to prevent or reduce flexure of the blade in the sharpening area and eliminates any burrs produced by the second grinding wheel from the cutting edge.

25. Method as claimed in claims 24, characterized by using a blade whose surface hardening treatment has a thickness of at least 30 micrometers and preferably equal to or greater than 80 micrometers and even more preferably equal to or greater than 90 micrometers and even more preferably equal to or greater than 100 micrometers.

26. Method as claimed in claims 24 or 25, characterized in that the inclination of the first grinding wheel (81) in respect of the first side (207) of the bevel and the thickness of said hardening treatment are such that the cutting edge (203) of the blade (19) remains within the thicknessinterested by the hardening treatment.

27. Method as claimed in one or more of the claims from 24 to 26, characterized in that said first and said second grinding wheel are motorized.

28. Method as claimed in one or more of the claims from 24 to 278, characterized in that said first and said second grinding wheel are moved against said

blade with a movement essentially parallel to the respective axis of rotation, said movement also recovering wear of the blade caused by successive sharpenings.

29. Method as claimed in claim 28, characterized in that the first grinding wheel comes into contact with the first side of the blade before the second grinding wheel comes into contact with the second side (209) of the blade; and in that the first grinding wheel moves out of contact with said first side of the blade after the second grinding wheel has moved out of contact with the second side of the blade

30. Method as claimed in claim 29, characterized in that the movement to move the grinding wheels towards and away from the blade is controlled so that the first grinding wheel moves out of contact with the first side of the blade after said blade has made at least one turn about its axis subsequent to the second grinding wheel moving away from the second side.

31. Method as claimed in one or more of the claims from 24 to 30, characterized in that the inclinations of said first and said second grinding wheel (83) are equal and opposed in respect of a lying plane of the cutting edge (203) of the blade (19), essentially orthogonal to the axis of rotation (B-B) of the blade, and in that the inclinations of said two sides (207, 209) of the bevel (205) of the blade in respect of the lying plane (PG) of the cutting edge of the blade are different, the first side being less inclined in respect of said lying plane than the second side, and in that said grinding wheels produce a symmetrical cutting edge in respect of the lying plane of the said cutting edge.

32. Method as claimed in claim 31, characterized in that the difference in inclination between said first and said second side is at least 1° and preferably between around 1.5° and around 2.5°.

33. Method as claimed in one or more of the claims from 24 to 32, characterized in that it uses a first grinding wheel with an extremely fine grain, from 7 to 46 according to ISO standards, and preferably around 7.

34. Method as claimed in one or more of the claims from 24 to 33, characterized in that it uses a second grinding wheel with a fine grain, from 45 to 91 according to ISO standards and preferably from 70 to 80.

35. A disk-shaped blade to cut rolls of wound web material, comprising an axis of rotation (B-B), a body with flat parallel faces (201A, 201B) and a cutting bevel (205), with a continuous cutting edge (203), defined by a first side (207) and by a second side (209), the first side having, before sharpening, a greater extension in

a radial direction, and at least said first side having a surface hardening treatment; characterized in that said surface treatment is a NITREG® treatment and has a thickness of at least 30 micrometers and preferably of at least 80 micrometers and more preferably approximately equal to or greater than 90 micrometers and even more preferably equal to at least around 100 micrometers.

36. Disk-shaped blade as claimed in claim 37, characterized in that at least said first side has a surface hardness of over 70 HRC and preferably equal to or greater than around 72 HRC.

37. Disk-shaped blade as claimed in claim 36 or 37, characterized in that said blade is made of alloy steel.

38. Disk-shaped blade as claimed in claim 39, characterized in that it is produced in molybdenum chrome steel.

39. Disk-shaped blade as claimed in one or more of claims 36 to 39, characterized in that at least said first side has surface thermal treatment by means of penetration of atoms or molecules within the structure of the base material forming the blade.

40. Disk-shaped blade as claimed in claim 40, characterized in that the surface treatment is a controlled nitriding treatment.

41. Disk-shaped blade as claimed in one or more of claims 36 to 39, characterized in that said surface treatment consists in a deposit of a material having a higher hardness than the hardness of the base material forming the blade.

42. Disk-shaped blade as claimed in one or more of the claims from 36 to 42, characterized in that said first side has, in respect of a lying plane (PG) of the cutting edge, a lesser inclination than the other side.

43. Disk-shaped blade as claimed in claim 43, characterized in that the first side is substantially parallel to the lying plane (PG) of the cutting edge of said blade.

44. Disk-shaped blade as claimed in claim 43 or 44, characterized in that the difference in inclination between said first and said second side is of at least 1° and preferably between around 1.5° and around 2°.

45. Disk-shaped blade as claimed in claim 43 or 45, characterized in that said first side has an inclination equal to or less than around 9° and preferably equal to around 8° in respect of said lying plane (PG).

46. Disk shaped blade as claimed in one or more of the claims from 36 to

46, characterized in that before sharpening said cutting edge (203) lies on a lying line (PG) that does not coincide with the plane of the center line (PM) of the blade and in respect of it is moved towards the first side (207).

47. Disk-shaped blade as claimed in one or more of the claims from 36 to 47, characterized in that it has a body delimited by two planes (201A, 201B) essentially parallel to each other and essentially orthogonal to the axis of rotation (B-B) of the blade.

48. Disk-shaped blade as claimed in one or more of the preceding claims, characterized in that the thickness of said treatment is such that the cutting edge of the blade, once sharpened by two grinding wheels contacting the sides of the cutting bevel, remains within the thickness of said treatment.